

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### DRAWINGS ATTACHED

#### Improvements in Sootblowers

We, DIAMOND POWER SPECIALTY LIMITED, of Woolston, Southampton, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to sootblowers of the long retracting lance type, which are used for cleaning the tubes of boilers or similar heat exchange apparatus.

A sootblower of the above type is normally mounted adjacent an opening or port in the wall of a boiler or the like, and includes a long lance tube, carried by a guide rail, which can be moved progressively further into and out of the boiler by movement of a carriage, on which it is mounted, along the guide rail. A pressurized cleaning fluid such as steam or air is supplied to the movable lance tube, commonly via a fixed feed tube carried internally of the lance tube, and issues from one or more orifices formed in the end of the lance tube, as this is moved along the rail, telescopically with respect to the fixed feed tube, to clean the internal boiler tubes or like. Means may also be provided to rotate the lance tube about its longitudinal axis as it is moved to obtain a more even distribution of fluid within the boiler.

Now when a sootblower is used with a high temperature furnace or the like, the lance tube being exposed to the flame for relatively long periods, a cooling problem may arise in that the normal flow of fluid through the lance tube is insufficient to cool it adequately. It is an object of the present invention to overcome this problem.

The invention consists in a sootblower of the long retracting lance type which includes means for inducing the cleaning fluid to flow in a turbulent manner along the walls of

the lance tube.

According to one form of the invention as set out in the preceding paragraph, in a sootblower having a fixed feed tube, the outlet end of the feed tube which discharges fluid into the lance tube, is provided with vane means for imparting a swirl to the cleaning fluid as it issues therefrom and inducing same to flow spirally along the walls of the lance tube. This arrangement produces a more turbulent flow of cleaning fluid along the lance tube than in known forms of sootblower, with a consequently greater cooling effect.

According to another form of the invention a sootblower lance tube is provided with a hollow sleeve insert adapted to induce the cleaning fluid to flow in turbulent manner along the walls of the lance tube.

The invention will now be described by way of an example with reference to the accompanying drawings in which:—

Figure 1 is a part sectional view of a lance and feed tube assembly for a sootblower, which includes a "spinner" attachment according to one form of the invention,

Figures 2 and 3 are side and front views respectively of the spinner attachment,

Figure 4 is a section through the end of a sootblower lance tube incorporating a sleeve according to another form of the invention and,

Figure 5 is a perspective view of another type of sleeve for use in a lance tube.

Referring firstly to Figures 1, 2 and 3, a long retracting lance type sootblower having a lance tube 1 and a fixed feed tube 2 is provided with a discharge nozzle attachment 3 at the outlet end of the feed tube. The nozzle attachment is fixed to the end of the feed tube and has a series of internal circumferentially extending spirally shaped vanes 4, which diverge towards the nozzle

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end of the lance tube so that in operation the cleaning fluid is thrown out along the walls of the lance tube 1 and flows spirally therealong. This swirl effect is apparent even at the end of a full extended 40 ft. long lance tube.

It is advantageous to ensure that the outside diameter of the nozzle attachment is not greater than the feed tube, itself, since it is desirable that the feed tube should be able to pass freely out of the lance tube assembly and the attachment is designed to have an extremely low pressure loss, being in the form of a high efficiency nozzle.

According to an alternative form of the invention as shown in Figure 4, the lance tube 1a of a sootblower is provided internally with a sleeve insert 5 along a part or all of its length, the sleeve being constructed from a sheet of expanded metal having for example, diamond shaped mesh openings. Alternatively, the sleeve may be made from a series of longitudinally spaced metal rings, i.e. as shown in Figure 5 inter-connected by metallic rods 7 attached on the outside of the rings so that when the assembly is positioned within the lance tube spacers are formed between the rings and the inner wall of the tube.

The sleeve insert effectively decreases the cross sectional area of the lance tube thereby accelerating the flow of the cleaning fluid and also, the slightly upstanding mesh intersections (in the case of an expanded metal sleeve) or the rings and ring-rod junctions (in the case of a metal ring type sleeve) break down the laminar flow of fluid normally present in the layer in the region of the lance tube wall and convert this to turbulent flow with a consequent increase in heat transfer and more efficient tube cooling.

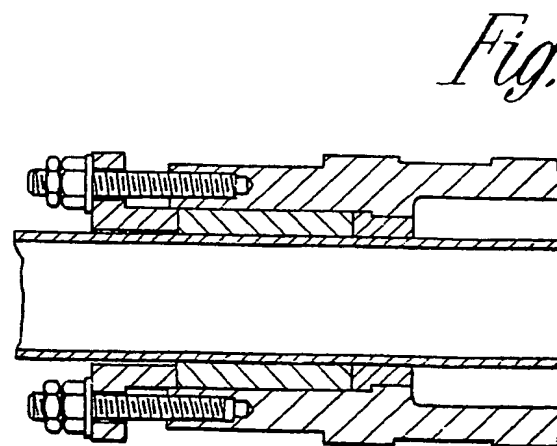
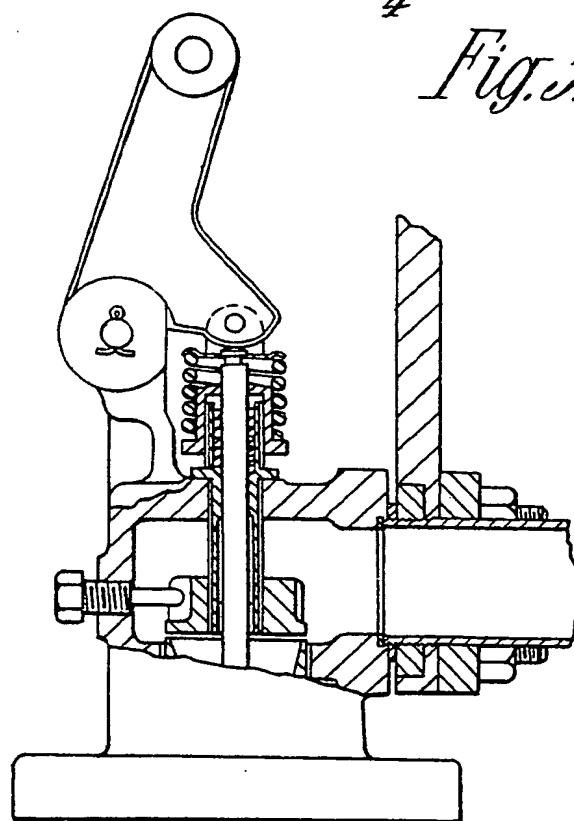
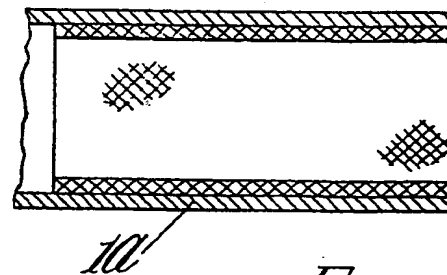
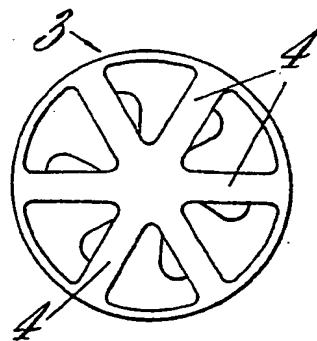
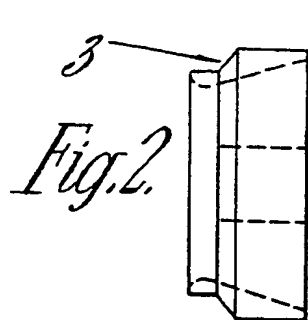
One or more such sleeves may be employed in a lance tube in spaced apart relation, a single sleeve may be employed in a region which is submitted to the greatest amount of heat, (normally the nozzle end of the tube) the sleeve may extend substantially the whole length of the tube, or a sootblower having a spinner attachment may also be provided with an auxiliary sleeve or sleeves positioned say near the nozzle end of the lance tube to further enhance the heat transfer.

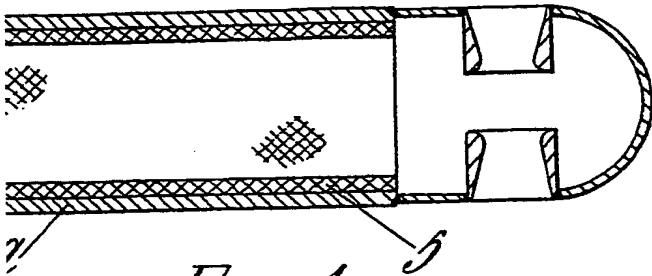
Various modifications are possible within the scope of the invention, which is in no way limited to the examples, outlined above and which is defined in the appended claims. The invention includes within its scope any means which induces the cleaning fluid to flow along the walls of the lance tube in a turbulent manner. For example, a sootblower could be provided with a ring of venturi shaped nozzles around the circumference of the lance tube which direct the cleaning fluid either with a spiral effect, or linearly, along the walls of the lance tube.

#### WHAT WE CLAIM IS:—

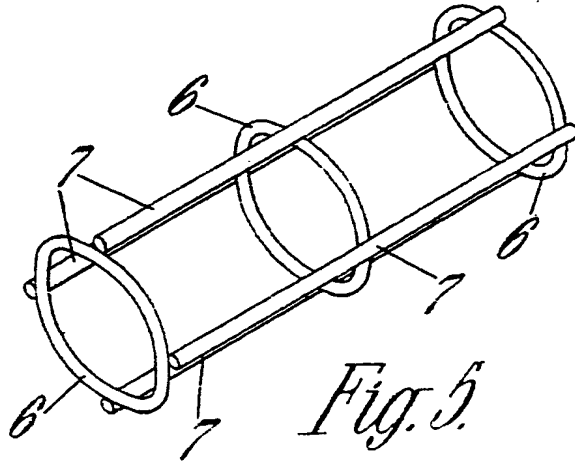
1. A sootblower of the long retracting lance type which includes means for inducing the cleaning fluid to flow in turbulent manner along the walls of the lance tube.
2. A sootblower as claimed in claim 1 having a fixed feed tube for discharging cleaning fluid into the lance tube, wherein vane means are provided for imparting a swirl to the cleaning fluid as it issues from the feed tube and inducing same to flow spirally along the walls of the lance tube.
3. A sootblower as claimed in claim 2 wherein the vane means are formed in a nozzle attachment disposed at the outlet end of the feed tube.
4. A sootblower as claimed in either of claims 2 or 3 wherein the vane means comprise a series of circumferentially spaced spirally shaped vanes which diverge towards the nozzle end of the lance tube.
5. A sootblower as claimed in any of the preceding claims having a sleeve insert in the lance tube adapted to induce the cleaning fluid to flow in turbulent manner along the walls of the lance tube.
6. A sootblower as claimed in claim 5 wherein the sleeve insert is formed from a sheet of expanded metal.
7. A sootblower as claimed in claim 5 wherein the sleeve insert is formed from a series of metal rings joined by metallic rods attached to the outer surfaces of the rings.
8. Sootblowers substantially as herein described with reference to the accompanying drawings.

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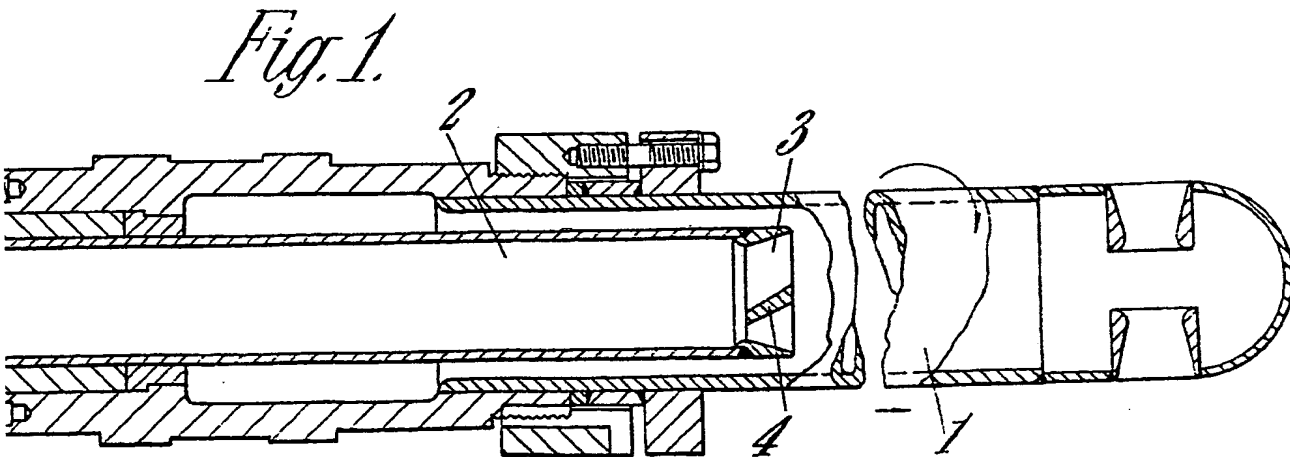




*Fig. 4.*



*Fig. 5.*



*Fig. 1.*

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